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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/680,052	10/05/2000	Simon Haig Melikian	Imaging 1	7329

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EXAMINER	
CHANG, JON CARLTON	
ART UNIT	**PAPER NUMBER**
2623	

DATE MAILED: 09/10/2003

10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/680,052	MELIKIAN ET AL.	
	Examiner	Art Unit	
	Jon Chang	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-29 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,2,5,12,15-19,21,23 and 26-29 is/are rejected.

7)☒ Claim(s) 3,4,6-11,13,14,20,22,24 and 25 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 05 October 2000 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6,8 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Response to Applicants' Amendment

1. The amendment filed December 28, 2000, has been entered and made of record.

Drawings

2. The drawings are objected to because they are not of sufficient quality to permit publication. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. Claims 17, 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 17, "the SR angles" lacks antecedent basis.

In claim 19, at line 4, "the scene stick angle" and "the stick angle" lack antecedent basis.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 5, 15-18 are rejected under 35 U.S.C. 102(b) as being anticipated by the article, "Generalizing the Hough Transform to Detect Arbitrary Shapes" by Ballard.

Regarding claim 1, Ballard discloses a method for locating a pattern, comprising:

providing a pattern image corresponding to the pattern to be located (section 4.3, first two paragraphs);

extracting at least one pattern contour from the pattern image (section 4.3, first paragraph; the boundary is a contour);

generating vector information for each of said at least one pattern contours, relative to a reference point (section 4.3, second and third paragraphs);

creating at least one reference table for storing the vector information, each of said at least one reference tables corresponding to said at least one pattern contour (section 4.3, second and third paragraphs);

providing a scene image, which will be searched for the pattern (section 4.3, fourth paragraph);

extracting at least one scene contour from the scene image (section 4.3, fifth paragraph);

generating vector information for each of said at least one scene contours (section 4.3, fifth paragraph); and

determining whether the pattern has been located within the scene image using the at least one reference tables and the vector information for the at least one scene

contours, and if so, identifying a location of the pattern within the scene image and an angle of rotation of the pattern within the scene image (section 4.3, fourth and fifth paragraphs; section 4.4; section 4.5, first and second paragraphs).

As to claim 5, Ballard discloses the method of claim 1, wherein the step of generating vector information for each of said at least one pattern contours comprises:

selecting a reference point for each of said at least one pattern contours (section 4.3, first and second paragraphs); and

generating vector information for each of said at least one pattern contours, relative to the selected reference point (section 4.3, first and second paragraphs).

As to claim 15, Ballard discloses the method of claim 1, wherein the step of determining whether the pattern has been located comprises:

calculating at least one potential reference point based on the extracted scene contour vector information and recording the instance of each of said at least one potential reference points (section 4.3, e.g., boundary points);

calculating at least one potential angle of rotation based on the extracted scene contour vector information and recording the instance of each of said at least one potential angles of rotation (section 4.3, fifth paragraph; note indexing on Φ);

identifying a location of the pattern within the scene image using the recorded potential reference points (section 4.3, fourth and fifth paragraphs); and

determining an angle of rotation for the pattern within the scene image using the recorded potential angles of rotation (section 4.3, fourth and fifth paragraphs; section 4.5, first and second paragraphs).

Regarding claim 16, Ballard discloses the method of claim 15, wherein the step of calculating at least one potential reference point comprises:

calculating a potential reference point for each point in the reference table (section 4.3, fifth paragraph).

With regard to claim 17, Ballard discloses the method of claim 16, wherein the potential reference point is calculated from the angles and the vector information (section 4.3).

As to claim 18, Ballard discloses the method of claim 15, wherein the step of calculating at least one potential reference point based on the extracted scene contour vector information and recording the instance of each of said at least one potential reference points comprises:

adding the potential reference point to a reference point accumulator (section 4.3, fifth paragraph).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ballard.

Claim 26 is a system which corresponds to the method of claim 1, therefore the remarks provided above for claim 1 are applicable to claim 26 for their common features. Ballard is silent with regard to a system. However, it would have been obvious to utilize some sort of system, e.g., a computer-based system, to implement Ballard's method. To implement the method without a system, would be impractical, if not extremely difficult. Typically, methods involving the Hough Transform, shape recognition, image processing, etc., to which Ballard is relevant (see abstract and keyword list) involve use of a system to implement (Official Notice). A computer-based would provide the processor and means for performing the steps of the method.

With regard to the first image capture device that captures a pattern image, the pattern image including an image of a pattern, and the second image capture device that captures a scene image to be searched for the pattern, while not taught explicitly by Ballard, this is considered obvious over Ballard. The shape represented by the R-table is somehow inputted into the system. The scene image is somehow obtained. Image

capture devices are well known in the art for inputting shape patterns and for capturing images of scenes (Official Notice). It would have been obvious to utilize capture device sto capture a pattern image and a scene image in Ballard's method because this would allow inputting of real-world images which may be detected in real-world scenes, making it more practical.

With regard to claim 27, Ballard does not disclose a database storing the at least one reference table. The Examiner takes Official Notice that it is well known to utilize a database to store a table. It would have been obvious to utilize a database to store Ballard's table because this would make retrieval of the appropriate table for a particular shape more efficient.

Regarding claim 28, the number of tables stored in the database would be based upon designer preference. The designer would store a particular number of tables in the database to suit a particular need or application.

Regarding claim 29, to utilize different or common image capture devices as the first and second image capture devices is not seen as a patentable distinction. A user or designer would utilize image capture devices based on a particular application, or availability of the devices.

9. Claims 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 5,600,733 to MacDonald et al. (hereinafter "MacDonald") and U.S. Patent 5,033,099 to Yamada et al. (hereinafter "Yamada").

As to claim 21, MacDonald discloses a method for pattern recognition, comprising:

extracting pattern vector information from at least one pattern image, each pattern image having a pattern reference point (Figs.3B; column 3, lines 28-33);

storing the pattern vector information for each of the at least one pattern image (column 3, lines 36 and 59-61);

extracting scene contour information from a scene image (column 3, lines 37-38);

calculating a potential reference point based on the scene contour information and the reference table (column 3, lines 37-39);

matching the potential reference point with one of the at least one pattern reference points (column 3, lines 39-41); and

identifying a pattern image corresponding to the matching pattern reference point (column 3, lines 39-41; column 6, lines 31-37).

MacDonald does not describe storing the pattern vector information in a table, and thus does not disclose the claimed step of creating a reference table containing the pattern vector information. However, creating reference tables to store pattern vector information is well known in the art. For example, in an analogous environment, Yamada teaches storing vector information in a table (column 11, lines 58-61). Utilizing a table in MacDonald, as taught by Yamada, would improve identification speed due to faster lookup. Therefore, it would have been obvious to one of ordinary skill in the art to modify MacDonald according to Yamada.

As to claim 23, MacDonald discloses the method of claim 21, wherein the pattern vector information includes a rotation invariant angle (since the vectors are distributed uniformly, column 4, lines 45-47, the angles are fixed and would not vary under rotation of the pattern).

10. Claims 2 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ballard and U.S. Patent 5,943,441 to Michael.

Regarding claims 2 and 12, Ballard is silent with regard to the details of extracting the contours. Michael teaches a method for extracting contours comprising:

locating at least one edge in the image (column 2, lines 53-54);

recording a starting point for the at least one edge (note title);

crawling along the at least one edge of the image ("contour tracking", column 2, line 44);

extracting a plurality of pixels from the at least one edge, beginning with the starting point and continuing with pixels identified while crawling along the at least one edge (column 2, lines 61-64) ;

filtering the plurality of extracted pixels (column 8, lines 20-22); and

creating a pattern contour from the plurality of extracted pixels (column 2, lines 56-57).

Since Ballard is silent as to how the contours are extracted, it would have been obvious to one of ordinary skill in the art to look to the prior art for an appropriate method of extracting contours. Michael's technique has several advantages, including

being more robust against object/background misclassification (column 2, lines 33-34). This would improve pattern detection in Ballard's method, and therefore it would have been obvious to one of ordinary skill in the art to utilize Michael's technique in Ballard's method. It would have further been obvious to utilize the Michael's contour extraction on either pattern or scene images.

Allowable Subject Matter

11. Claims 1, 3-4, 6-11, 13-14, 20 , 22 and 24-25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

12. Claim 19 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jon Chang whose telephone number is (703)305-8439. The examiner can normally be reached on M-F 8:00 a.m.-6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703)308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)305-4700.

Jon Chang
Primary Examiner
Art Unit 2623

Jon Chang
September 8, 2003